Epitomes

Important Advances in Clinical Medicine

Physical Medicine and Rehabilitation

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The Council on Scientific Affairs of the California Medical Association presents the following epitomes of progress in physical medicine and rehabilitation. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and clinical importance. The items are presented in simple epitome, and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, researchers, and scholars to stay abreast of progress in medicine, whether in their own field of special interest or another.

The epitomes included here were selected by the Advisory Panel to the Section on Physical Medicine and Rehabilitation of the California Medical Association, and the summaries were prepared under the direction of Murray E. Brandstater, MD, and the panel.

Female Athlete Triad

WOMEN HAVE BEEN TRYING to make themselves an equal force in athletics for the past decade. As this trend continues, physicians are caring more often for young women in competitive sports. Few differences exist in the types or even the frequency of injuries incurred by these women compared with men. So why should physicians, as caretakers of women athletes, view them differently than their male counterparts?

A new epidemic that is unique to female athletes is a triad of separate but interrelated disorders observed in adolescent and young adult women athletes. Consisting of disordered eating, amenorrhea, and osteoporosis, this problem is now called the "Female Athlete Triad." The problem is not new. Well-known elite athletes have come forward with their battle with this triad. Little attention has been paid to recognition, treatment, and prevention, however.

Women athletes are under increasing pressure not only to be strong competitors, but also to have the perfect body type and weight for their chosen sport. Both internal and external pressures from coaches, judges, and parents contribute. Any female athlete is at risk for this triad, but women who participate in endurance and performance sports, such as gymnastics, ballet, and long-distance running, where an athlete is judged on appearance or where low body fat is an advantage, are at highest risk for extreme weight-control behaviors. This, in turn, puts the athlete at substantial risk for the associated disorders of amenorrhea and osteoporosis. Each portion of this triad increases morbidity and mortality, but the three together are dangerous.

The concept of "disordered eating" is relatively new yet extremely common among female athletes, with reports that 15% to 62% practice pathogenic weight-control behaviors. A host of abnormal behaviors are reported, ranging from poor nutrition and restrictive eating at one end to the true eating disorders, anorexia nervosa and bulimia, at the extreme. Any of these disordered eating behaviors can be unhealthy, and an athlete need not fit the criteria of the *Diagnostic and Statistical Manual of Mental Disorders* for an eating disorder to be at risk for serious health problems.

The combination of restrictive eating, excessive training, and decreased body weight may all predispose an athlete to amenorrhea. Athletic amenorrhea is a much more complex phenomenon than once thought, with weight loss, the presence or absence of body fat, and emotional and physical stress all playing a role. The endocrine profile of an amenorrheic female athlete shows a long-term estrogen-deficient state similar to that of postmenopausal women. Because estradiol is extremely important to facilitate calcium uptake into bone, amenorrhea and the associated hypoestrogenic state may predispose female athletes to premature osteoporosis. The long-term effects of amenorrhea on future fertility are still unclear. The data suggest that the reproductive effects of athletic amenorrhea are reversible when the problem is treated.

Osteoporosis, the third part of the triad, refers to early bone loss and inadequate bone formation. Previously considered to be a disease of elders, in young amenorrheic women, 2% to 6% of bone mass can be lost per year, with a total loss of as much as 25% of total bone mass. A young athlete in her 20s may end up with the bone mass of a 60-year-old woman. This puts the athlete at a threefold risk for stress fractures. Of further concern is that bones gain mass only during the first three decades of life, with 95% of maximum density reached by age 18. These athletes are actually losing bone at a time in life when they need to be storing bone for the inevitable loss in later years.

To prevent or reduce the incidence of this triad, awareness and early detection are crucial. Preparticipation physical examination is the ideal time to identify athletes who already have or are at risk of the triad developing. Because

female athletes will rarely bring up issues regarding diet or menstrual history, pertinent questions must be asked. It is often difficult to get an adequate history involving these sensitive issues simply by having an athlete answer a questionnaire. If possible, having a station where the athlete talks with a trainer, psychologist, or physician for a few minutes will elicit a more revealing history.

In addition, checking for subtle physical signs may identify an athlete who already has a disordered eating pattern. These athletes are not necessarily abnormally thin. They may have a decreased pulse rate of 40 to 50 beats per minute. Hypotension, hypothermia, lanugo hair, or a history of fainting can be clues to metabolic disturbances. Parotid swelling (chipmunk cheeks), erosion of tooth enamel or a large amount of dental work, and Russell's sign—finger and nail changes on the first and second digits of the dominant hand—are all signs of bulimia.

Rarely is an athlete excluded from participation for disordered eating or amenorrhea. Yet, these carry substantial possible consequences in psychiatric, endocrine, and skeletal well-being. If, as with other problems identified on an examination, athletes at risk for the triad are denied participation until further evaluation and treatment are initiated, the prognosis for recovery will be improved. It is important for physicians to encourage women to participate in sports in a healthy manner and to help eliminate the "win-at-all-costs" mentality.

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Diagnosing Tibial Stress Injuries in Athletes

AS MANY AS 10% of all injuries seen in sports medicine clinics are stress fractures. Running is the most common activity causing these injuries, and the tibia is the most frequent site of injury. The term stress fracture is, however, not appropriate for most tibial stress injuries. Most of the injuries traditionally classified as stress fractures show no evidence of a fracture line or break in the continuity of bone, but exhibit various degrees of bone remodeling and stress reaction.

Radiographs are not a sensitive indicator for bony stress injuries. Magnetic resonance imaging (MRI) has been found superior to isotope bone scanning for diagnosing the degree of tibial stress injuries in running athletes. Magnetic resonance imaging with the fat-suppression technique can clearly identify four grades of tibial bony stress injury: periosteal inflammation associated with the shin splint syndrome, followed by progressive marrow edema, first on fat-suppressed T2-weighted images, then T1-weighted images, and ultimately a cortical stress fracture. Additional advantages of the use of MRI include its multiplanar capability, resulting in precise anatomic localization, lack of radiation exposure, and substantially less imaging time than triple-phase bone scan, although it is currently more costly.

Magnetic resonance imaging is recommended for grading tibial stress injuries in runners and other athletes to allow more accurate recommendations for rehabilitation and a return to impact activity. Athletes with a grade 1 stress injury can usually return to running on grass or soft dirt within three weeks and those with a grade 2 injury within six weeks. Those with grade 3 and 4 injuries are typically more symptomatic, with most having pain with daily ambulation. On physical examination, they have focal bone tenderness and increased pain with percussion, either directly over the involved bone or, in severe cases, at a distance from the site of pain. Athletes with a grade 3 injury are often unable to return to impact activity for 9 weeks and those with a grade 4 injury for at least 12 weeks.

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Alcohol Use and Traumatic Brain Injury

TRAUMATIC BRAIN INJURY and alcohol abuse are overlapping conditions that interact on several levels. Alcohol abuse, before and after injury, and the presence of alcohol in the blood ("positive blood alcohol level") at the time of the brain injury can complicate recovery. For these reasons it is important to screen for alcohol-related problems in patients with brain injuries and to use various motivational techniques described here to encourage survivors to abstain from alcohol for at least a year after injury.

Preexisting alcohol abuse is common among persons with traumatic brain injury, with as many as 58% reporting a history of alcohol abuse or dependence and 25% reporting previous treatment for substance abuse. Alcohol consumption data also suggest that persons with traumatic brain injury are more likely than their peers to have been heavy drinkers. Alcohol use is involved in many traumatic accidents, including those resulting in brain injury. One study showed that 46% of 2,657 trauma patients had a positive blood alcohol level at admission, 36% were